Executive Summary

The Department of Energy (DOE) Office of Oversight conducted a follow-up review to the 1996 independent oversight evaluation of environment, safety, and health (ES&H) programs at the Pacific Northwest National Laboratory (PNNL) September 28-October 6, 1998. The review was conducted to determine the status of corrective actions taken by the Richland Operations Office (RL) and PNNL to address selected issues and concerns identified during the 1996 Office of Oversight evaluation.

Since that evaluation, both RL and PNNL have made significant improvements in safety management. RL has reorganized its staff to better focus on safety management and conducts weekly tours of facilities to directly observe ES&H performance. RL has also teamed with PNNL to develop clear goals for improving safety management and to resolve identified weaknesses.

PNNL has established management systems that facilitate the integration of safety into laboratory activities. These management systems include:

- The integrated assessment program, which includes both self-assessments and independent ES&H assessments
- The Standards Based Management System (SBMS), which enables PNNL to identify applicable requirements and standards and provide electronic access for the Laboratory staff
- The facility use agreements, which provide a mechanism for ensuring that facility users do not introduce hazards that were beyond the scope of those evaluated by facility managers.

The improvements in RL and PNNL management systems have resulted in enhancements to PNNL programs that were identified as weak in the 1996 Oversight evaluation, including conduct of operations, work planning and control, configuration management, self-assessment, and corrective actions. Although additional efforts are needed, RL and PNNL have effectively addressed most of the weaknesses identified on the 1996 evaluation. Notable enhancements include:

- The development of effective tools, combined with strong leadership and commitment from facility management, is contributing to better work planning and control processes.
- The conduct of operations practices of the power operators at the Radiochemical Processing Laboratory (RPL), which were deficient in 1996, are effective and are being used as a model for the rest of RPL.
- Detailed self-assessments are being performed by all organizations at all levels within PNNL. These assessments are providing significant findings that are resulting in continuous improvement in safety.

While much progress has been made, both RL and PNNL need to make additional improvements to address remaining weaknesses and ensure that the full potential of improved programs is achieved. RL has yet to remedy the weaknesses identified in the Facility Representative program, thereby hindering RL's ability to effectively monitor and evaluate PNNL safety management performance. RL also needs to increase efforts to independently review and validate the effectiveness of PNNL corrective actions.

PNNL needs to make additional improvements in several areas, including ensuring a fully integrated approach to job hazard analysis and work control processes and ensuring

the rigor and formality of self-assessments. Most significantly, improved management leadership is needed to ensure adherence to procedures in conducting PNNL activities. While adherence to procedures has been notably improved for some groups (e.g., power operators), PNNL continues to experience deficiencies in adherence to procedures, including instances where PNNL managers did not follow procedures. Additional senior management attention is needed to ensure that all levels of the organization understand and accept the need for procedure compliance.

Overall, RL and PNNL have made significant progress and have established the management systems and infrastructure for developing a fully effective program. RL and PNNL recognize that additional improvements are needed and have taken actions accordingly. RL has recently added Facility Representatives and subject matter experts to enhance their ability to perform oversight of PNNL safety management programs. PNNL recognizes that procedural adherence is still a problem and has initiated efforts to identify and implement additional corrective actions. Continued management attention is needed to ensure that ongoing initiatives are fully implemented and verified to be effective.

1.0 Introduction

Pacific Northwest National Laboratory

In addition to evaluating overall integrated safety management systems at Department of Energy (DOE) sites, the Office of Oversight is committed to ensuring that issues or concerns identified during previous evaluations and accident investigations are brought to a satisfactory resolution in a timely manner. To fulfill this commitment, the Office of Oversight conducts follow-up reviews to monitor progress in implementing improvements both complex-wide and at specific sites. As part of this process, an onsite review was conducted at the Pacific Northwest National Laboratory (PNNL) during the period September 28-October 6, 1998, to follow up on issues from the 1996 independent oversight evaluation of environment, safety, and health (ES&H) programs.

Since 1996, PNNL has focused on reducing the amount of hazardous material in PNNL facilities and on reducing the number of nuclear facilities at the PNNL site. The follow-up review focused primarily on corrective actions and progress to address previously identified performance issues and concerns. Lines of inquiry for this assessment corresponded to specific issues and concerns raised during the 1996 Office of Oversight safety management evaluation in the following selected areas:

- Work planning and control
- Conduct of operations
- Configuration management
- Integrated assessments
- Corrective actions management
- DOE management, direction, and monitoring
- PNNL initiatives.

The review included interviews, documentation reviews, area walkdowns, and observation of work activities. The personnel interviewed included managers, supervisors, and workers from DOE Richland Operations Office (RL), PNNL, and Fluor Daniel Northwest (which provides construction support to PNNL). Work activities were observed at the Radiochemical Processing Laboratory (RPL) and the Environmental Molecular Sciences Laboratory (EMSL) at PNNL. Positive attributes, weaknesses, and an overall assessment of each follow-up area are provided in Section 2 of this report.

OVERVIEW OF PNNL

SITE: The Pacific Northwest National Laboratory comprises approximately 332 acres of semiarid desert on the Hanford Site and various offsite locations in southeastern Washington State. Most DOE-owned, PNNL-occupied facilities are located in the southern part of the Hanford Site's 300 Area. DOE-leased space associated with PNNL is located south of the 300 area and adjacent to the Batelle Memorial Institute private facilities in the Richland North Research Complex.

SITE MANAGEMENT: The site is owned by DOE and operated by Battelle Memorial Institute. Approximately 3,300 persons work at PNNL. The Richland Operations Office's Office of the Assistant Manager for Science and Technology has the primary responsibility for ensuring that the PNNL integrated safety management program is implemented under DOE Policy 450.4, Safety Management System. Also providing line management direction are the Office of Science (formerly the Office of Energy Research) and the Office of Environmental Management at DOE Headquarters.

MISSION: PNNL's core mission is to deliver environmental science and technology in the service of the nation and humanity. This mission is in line with the DOE's Strategic Plan and the Strategic Laboratory Mission Plan, where PNNL is designated as a principal laboratory in the environmental quality mission, a major contributing laboratory in both science and technology and energy, and a participating laboratory in national security.

2.0 Results

2.1 Work Planning and Control

Background

The April 1996 Oversight evaluation examined elements of work planning and control and identified weaknesses in pre-job briefings, work procedure compliance, radiological work planning, training of health and safety personnel reviewing work packages, and hazards assessments. The PNNL integrated safety management system (ISMS) verification process, which was conducted in June 1998, evaluated the implementation of ISMS core functions and identified a need for improvement in implementing hazard analysis and controls and clarifying roles and responsibilities for work control-related positions (e.g., cognizant space manager).

Positive Attributes

Several institutional "tools" are improving work planning and control. The Standards Based Management System (SBMS) provides a user-friendly means of accessing laboratory policies, standards, manuals, program descriptions, and facility use agreements, which are used in the planning and conduct of work activities. The Electronic Prep and Risk System provides research and development (R&D) project managers with a computer-based form to identify hazards, define mitigation and control measures, ensure approvals, and identify subject matter experts. The Service Work Request, when fully implemented, will serve as a central system for requesting and planning facility support work in such areas as maintenance, fabrication, engineering calibration, transportation, and building and grounds.

Initiatives at EMSL and RPL are improving the consistency, clarity, and efficiency of planning and controlling work at the activity level. The use of a core team consisting of the building manager, field engineer, safety representative, work planner, and maintenance supervisor has improved the process of planning, evaluating, prioritizing, and completing facility work activities. Both EMSL and RPL are in various stages of implementing an Integrated Operations System (IOPS) which is a computer-based tool for conducting safety and health assessments, controlling access to workspaces, determining training requirements, and documenting hazard awareness information for individual laboratories and work spaces within the facility. Both the core team concept and IOPS have resulted in improvements in work planning and control.

Strong facility management at EMSL and RPL has effected positive changes in work planning and control. Building and division managers at EMSL and RPL have been instrumental in implementing new initiatives (e.g., core team and IOPS) that have strengthened work planning and control and improved the integration of ES&H into work activities. Building and division managers are actively involved in the planning, authorization, and oversight of a diversity of work activities including maintenance, R&D, and facility operations. A noteworthy example is the responsiveness of the Facility Operations Manager and EMSL Building Manager in promptly assessing, evaluating, and implementing corrective actions for a subcontractor work control concern identified during this evaluation.

Weaknesses

PNNL processes for work control and job hazard assessment processes for research and maintenance activities and work performed by subcontractors are not well coordinated, clearly understood, or consistently implemented. There is no clear process for

ensuring that work control and hazard analysis processes are coordinated effectively with existing management systems and that the relationships between them are clearly defined. As a result, the work control processes are often difficult to understand and manage, and they are not consistently applied at the activity level across divisions. For example, an important element of work planning and control–job hazard analyses–is not adequately defined in site documentation. For example, there is no job hazard analysis subject area in the SBMS to define the requirements.[1] The lack of clear and consistent guidance has contributed to weaknesses in defining various types of hazard analyses, requirements for hazard screening, methods for evaluating identified hazards, integration of ES&H disciplines, training and qualifications for individuals performing hazard assessments, and requirements for documenting the results of a job hazard analysis. Several of these weaknesses were also identified in a recent PNNL self-assessment of the job hazard analysis system. Performance of these tasks relies too heavily upon the subject matter experts instead of a standards-based process. The weaknesses were evident in several types of work activities, including:

- **Research activities.** There is no clear process that charts the course for performing hazard analyses for research activities from project conception to implementation at the benchtop, identifies the minimum requirements or triggers for ES&H involvement, and identifies methods for analyzing, controlling, and documenting hazards. While both SBMS and the Prep and Risk system are valuable tools in this process, each has limitations. SBMS, for example, does not address all hazards that may be encountered in PNNL workspaces (e.g., heat and cold stress, lead, and hazards associated with rodents, fowl, and venomous animals). Some SBMS policies, such as the use of Controlled Operations Permits (PNL-MA-43), are not linked into other work planning processes (e.g. Prep and Risk, and the job planning package permit checklist). Prep and Risk, when applied to large projects (e.g., tritium) may not identify all hazards, controls, and permits at the task level (e.g., electrical and cryogen hazards for tritium extraction in the lab). The rolldown of hazards and controls identified by Prep and Risk into project plans, research and field proposals, procedures, and instructions at the benchtop lacks clarity.

- **Maintenance.** For PNNL maintenance activities, the work planning process is described in PNL-MA-761. Hazards, hazard controls, and criteria for performing "Three Day Work" are defined in PNL-MA-761. However, the PNNL documents do not adequately describe the job hazard analysis process and requirements for performing a hazard analysis in support of planned work, work that requires engineering support, "Do-It-Now" work, or other work. Furthermore, there is no requirement for ES&H review of hazards and hazard controls for work performed under PNL-MA-761. Each safety discipline (radiation protection, industrial hygiene, industrial safety) performs its own analysis of work activity hazards according to its own procedures, but only if contacted by the maintenance planner, who typically has no training in these disciplines or in hazard analysis or hazard awareness. There is no requirement that work planners document the basis for their decision not to perform a hazard analysis. While some elements are in place, the existing processes do not constitute an integrated approach to hazard analysis and control. A pilot program has been initiated to develop an integrated hazard analysis process, but the process has not been formalized or implemented across all divisions.

- **Construction.** Most construction work at PNNL is performed by subcontractors. Subcontractors' work planning and control processes and job hazard analyses are as varied as the nature of the construction work and the practices of the subcontractor who performs that work. In a limited sampling of work activities, shortcomings with respect to job hazard analyses for construction activities are evident (see the following weakness).

Contributing to these conditions is the lack of a clear description of the various work control and job hazards assessment processes, the relationships

[1] The SBMS is the PNNL system for delineating policies and guidance for specific ES&H elements, such as radiation protection. The ES&H elements are referred to as "subject areas" and include PNNL policies and guidance relating to that element.

between them, the requirements for applying them, and the management systems that should ensure their use. Such a "road map" could clarify the various processes and promote consistently effective implementation across the site.

Weaknesses were identified in PNNL's program for managing construction safety and health, and in subcontractor construction work practices. PNNL has not placed adequate institutional emphasis on construction safety and health, as identified in a recent PNNL self-assessment. PNNL has not designated a construction safety subject matter expert, nor has it defined construction safety as a subject area in the SBMS. PNNL has provided minimal guidance for construction safety guidance in the SBMS system (PNL-MA-43). A construction safety and health subject area, however, is being discussed for implementation in 1999.

Field observations of construction subcontractor work associated with an aerial man-lift work activity in EMSL identified deficiencies in construction safety work practices, such as:

- No maintenance history for the lift was evident, nor was a vendor manual on site for identifying the maintenance requirements.

- The pipefitters using the aerial lift did not follow all the required safety requirements specified within their craft-specific job safety analysis for work from elevated work platforms (i.e., inspecting the lift in accordance with the manufacturer's requirements and ensuring that an operator's manual was on board). Since this was a skill-of-the-craft activity, the generic craft-specific job safety analysis served as the hazard analysis and established the controls to mitigate the hazard.

- Daily pre-use inspections of the aerial platform were not performed in accordance with the requirements of the subcontractor's procedure on elevated work platforms and aerial lifts.

- The construction work activities were insufficiently described in the work package to determine whether the job safety analysis adequately addressed all the hazards.

Work Planning and Control Assessment

Overall, many positive work planning and control processes are evident in PNNL research, maintenance, and construction work activities. Facility core teams provide an effective mechanism for integrating facility building management, facility engineering, safety and health, maintenance, and other work groups in collectively evaluating work activities with respect to worker safety. At EMSL and RPL, building and line management has demonstrated ownership and control of work activities within their facilities through facility use agreements, integrated operations, and a strong building manager concept. ES&H self-assessments, particularly those performed on the Job Hazard Analysis System and on Health and Safety Agreements with Subcontractors, have been effective in identifying programmatic issues that impact work planning and control. Through safety committees, pre- and post-job safety briefings, job walkdowns, and stop-work authority, workers are provided avenues for continually improving safety within their work spaces. Prep and Risk and the SBMS have provided project and product line managers and work planners with a user-friendly means for globally identifying, understanding, and controlling hazards associated with research and infrastructure work activities. New tools under development, such as the Service Request System and the Consolidated Job Hazard Identification Worksheet, will further improve work planning and control processes.

However, without a clear road map that documents the processes and defines the limitations of the planning tools, it is often difficult for workers to understand and use the various work planning and control processes for research, maintenance, and construction. The difficulty in clearly defining the processes is particularly evident in job hazard analyses. Efforts to enhance flexibility for performing job hazard analyses have resulted in the development of processes that are difficult to understand and manage, and have led to inconsistent application across PNNL. Clear and consistent guidance is lacking for hazard screening, hazards assessment methods, integration of ES&H disciplines, training and qualifications for individuals performing hazards assessments, and requirements for documenting the results of the process. Furthermore, work, particularly with respect to construction

subcontract work, is not always performed in accordance with work procedures that are based on hazard analyses, indicating that additional management attention is needed.

2.2 Conduct of Operations

Background

The April 1996 Oversight evaluation identified significant weaknesses in the implementation of conduct of operations principles at PNNL, including weaknesses in procedure quality and usage (e.g., activities where procedures did not exist, were inadequate, or were not followed). The Oversight evaluation found that the lack of formality in procedure compliance was attributed at least in part to a site cultural issue. For example, noncompliance with operating procedures as a means to work around deficient procedures was considered accepted practice by workers and was accepted or directed by supervision. Some of the conduct of operations problems had been identified at PNNL prior to the April 1996 evaluation, and corrective actions were under way. For example, PNNL included conduct of operations as one of the improvement initiatives in the 1994 Operations Improvement Plan. The PNNL ISMS verification process, which was conducted in June 1998, addressed implementation of ISMS core functions, but did not focus on evaluating implementation of conduct of operations practices.

Positive Attributes

EMSL and RPL power operators demonstrated good conduct of operations practices and performed work in accordance with comprehensive conduct of operations requirements and guidelines specific to power operations. Operator round sheets are well designed, and the associated procedures provide detailed instructions on performance of rounds. System operating procedures are detailed and provide the necessary information to perform system operations. Operators interviewed were knowledgeable of their responsibilities, adhere to procedures, and utilize innovative techniques when necessary, such as use of binoculars to obtain reading that are difficult to reach. Completed operational documents, such as operator narrative logs, round sheets, independent verification sheets, and lockout/tagout documentation, were legible, complete, and in accordance with procedures.

The RPL Operations Manual, when fully implemented, will provide clear, comprehensive, and consistent conduct of operations requirements and guidance to the various divisions working at RPL. The RPL Operations Manual was approved and placed on the RPL Web page on October 1, 1998. It incorporates the comprehensive conduct of operations guidance already available to the power operators and is applicable to all personnel performing work in RPL. Section B of the manual contains 18 chapters corresponding to the 18 chapters of DOE Order 5480.19, Conduct of Operations. The Section B chapters provide facility-specific discussion, applicability, expectations, and other information for operations. The chapters are well written and accurately reflect the intent of the corresponding chapters in the order. Two of the chapters are noteworthy in their application of the intent of the order: Chapter 16, "Technical Work Documents and Operations Procedures," and Chapter 17, "Operator Aid Postings." The chapter on procedures provides clear definitions of the various types of procedures at RPL and expectations on use and content of each type. The chapter on operator aids contains a section specific to the use of operator aids in R&D laboratories that provides clear directions and criteria for operator aids in a laboratory environment.

The EMSL building emergency response organization and EMSL workers reacted to a potential emergency in a highly organized, coordinated, and professional manner. During the

Environmental Molecular Sciences Laboratory

Oversight evaluation, the EMSL building experienced a fire alarm and associated building evacuation. After arriving at the assembly area, the alternate building emergency director established the appropriate accountability actions with the building fire wardens. Appropriate equipment and procedures were readily available (e.g., an EMSL building emergency director kit), and personnel (e.g., the primary building emergency director) arrived promptly and assumed command. The building emergency director appropriately referred to building emergency procedures and performed the necessary steps to control the event (e.g., coordination with the fire department and verification of required notifications). After the alarm was determined to be a false alarm, the building emergency director conservatively used the emergency termination and recovery procedure as a guide for completing actions prior to providing the all-clear signal (e.g., checking with personnel in the assembly area for new hazards that may have been introduced when ongoing experiments were abandoned). A post-incident debrief was held to discuss the event, problems encountered, causes, planned corrective actions, and lessons learned.

Weaknesses

PNNL continues to experience deficiencies in use of and adherence to procedures. Although power operators have adopted good conduct of operations practices (including procedure compliance), some PNNL organizations have not achieved consistent procedure compliance. The Oversight team observed or discovered many instances of failure to use or adhere to procedures. Recent assessments, such as those performed by PNNL Independent Oversight, have also found deficiencies in procedure adherence. As a result of a recent assessment, the PNNL Independent Oversight staff concluded that sporadic instances of procedure non-compliance continue and that additional management attention is needed. Examples of weaknesses in procedure quality, use, or adherence include:

- At least four of the occurrences reported by PNNL in 1998 involved procedure violations. According to the chairman of a recent PNNL Price-Anderson Working Group, three of these reports involve violations of procedures by PNNL level two managers who understood the requirements and chose not to follow them.

- Masking tape marked "TEST – DO NOT OPERATE" was used for test control in lieu of an approved operator aid system.

- A low-level waste compactor operation procedure calls for adding two inches of absorbent to the bottom of a waste drum before adding the first bag of waste to the drum, however this step is no longer performed. The work group manager was aware of the situation but did not initiate a procedure change before allowing work to proceed.

- An aerial man lift was operated without performance of the required pre-operational checks. (See the Work Planning and Control section for additional details).

- During a high efficiency particulate air (HEPA) filter change-out job utilizing a controlled operations permit, line management did not adhere to the posting and training requirements of the Manual Controlled Operations Policy.

Failure to follow procedures is a particular concern because procedure quality, use, and adherence are important elements of management control, implementation of requirements, and integrated safety management.

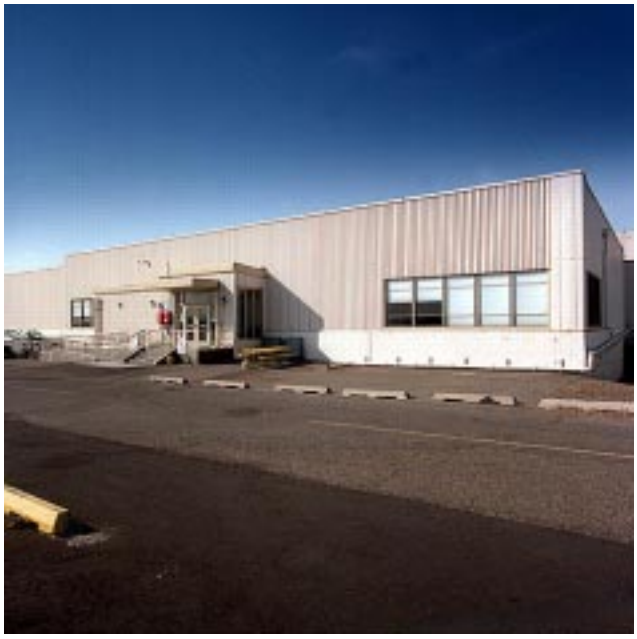
The institutional-level Technical and Operating Procedures subject area within SBMS provides a vague and inadequate definition of the types of applicable work documents. Unclear definitions have contributed to inconsistent application of procedure use requirements and procedure development guidelines for some personnel (i.e., those not falling under facility-level requirements and guidelines, such as the RPL Operations Manual or the EMSL Power Operations procedures). The subject area requires all technical and operating procedures developed or revised since October 1997 to contain a procedure use category. Examples of non-compliance with this requirement were observed in operating procedures for research or experimental equipment, acceptance test procedures, and waste handling procedures. This subject area does not contain

procedure use guidelines for other subject area procedures. As a result, personnel were unsure of the applicability of the technical and operating procedure use requirements for procedures contained within subject areas, such as lockout/tagout.

Conduct of Operations Assessment

With the exception of the above weaknesses, the conduct of operations program at PNNL is generally effective. The RPL Operations Manual is applicable to all workers in RPL and will contribute to overall improvements in conduct of operations if implemented as planned. However, attention is needed to ensure full and effective implementation of the RPL Operations Manual in a timely manner, and to ensure that all personnel use and adhere to established procedures. While progress has been made for power operators, such attention is particularly important in light of the fact that procedural adherence has been a recognized problem for over two years at RPL.

The EMSL power operators have satisfactory procedures for conduct of operations practices, including a power operator procedure on procedure use and adherence. Implementation of conduct of operations principles at the working level by facility operations personnel was generally good. Other PNNL personnel, such as researchers, construction, and waste management personnel at EMSL (and at RPL until full implementation of the Operations Manual), do not have the benefit of comprehensive conduct of operations guidelines and must rely on the higher-level, somewhat vague SBMS subject areas for guidance. In those cases, working-level procedures are generally technically adequate, although there are deficiencies in use category designation and clarity of steps. Several instances of non-compliance with procedures by PNNL workers outside of facility operations were noted in the weakness above.



Radiochemical Processing Laboratory

The IOPS at EMSL was developed to identify the safe boundaries of operation. However, the safe conduct of operations practices necessary for performing work within those boundaries are not well defined within IOPS. At RPL, the Operations Manual complements the IOPS to fill the void. This Manual should be considered as a model for all PNNL facilities. Continued line management attention is needed to ensure that all workers, particularly those who do not have the benefit of existing comprehensive conduct of operations guidelines, receive the guidance necessary to understand their roles and responsibilities for safe conduct of operations practices.

2.3 Configuration Management

Background

The Office of Oversight evaluation in 1996 indicated both sitewide and facility-specific weaknesses in some elements of the configuration management system, including the maintenance of facility drawings and the unreviewed safety question determination (USQD) process. The DOE ISMS verification recently identified weaknesses in the PNNL USQD process. An initiative to integrate work control activities and define configuration management for PNNL facilities began in 1992. As a result, several project plans have been developed supporting configuration management implementation, and a number of initiatives, such as the facility use agreement and the Prep and Risk process, have been completed.

PNNL's configuration management program has two basic purposes: (1) to identify and control facility systems, structures, and components and their associated documentation, and (2) to create a single service process (via facility-related service request) to integrate work control processes.

Positive Attributes

Configuration management improvements related to drawings, labeling, and modification control were evident in RPL. A walkdown of a sampling of essential drawings revealed no significant deficiencies. Valve and equipment labeling was also adequate for essential systems in RPL. Essential drawings were being modified as required to incorporate changes from facility modifications.

Weaknesses

The configuration management improvement program lacks a current project plan. This weakness was previously identified in a PNNL Independent Oversight review of configuration management. The lack of an up-to-date configuration management implementation plan makes it difficult to determine whether the project is on schedule and receiving the proper resources. No specific milestones are in place for the remaining tasks.

Even though RL and PNNL were aware that the RPL safety analysis report (SAR) did not identify safety-significant equipment as required by DOE Order 5480.23, they did not incorporate the needed changes during the last annual SAR update. The SAR did not include a listing of the safety-significant structures, systems, components, equipment, and processes. For example, exhaust ventilation was not identified as a safety-significant system in the SAR. PNNL has made some improvements in their USQD processes, including revising the RPL USQD procedure (OPSA-002) to incorporate the requirements of DOE Order 5480.21 and improving the quality of USQD screens and evaluations. However, the lack of a definitive listing of safety-significant systems in the SAR hinders PNNL's ability to perform defensible and consistent USQD reviews.

Configuration Management Assessment

PNNL has made progress toward addressing the configuration management concerns described in the 1996 Office of Oversight evaluation report. The basic elements for configuration management are in place and functioning at PNNL. The tasks remaining to be completed include:

- Complete documentation of the configuration management program, the service request process, the facility review board process, and the Battelle engineering files procedures in SBMS.
- Validate equipment list data.
- Continue work on facility baseline matrices. (Three buildings have been completed, 19 are close to completion, and 11 are in the process of completing essential drawings.)
- Upgrade the RPL SAR to include safety-significant equipment.

Increased management attention is needed to establish a meaningful implementation plan, formalize and complete the remaining tasks, and monitor progress.

PNNL has addressed the USQD concerns identified by the DOE ISMS verification report. However, RL and PNNL did not ensure that the RPL SAR had all the necessary list of safety-significant equipment. Adding this list is being considered for the next annual SAR update; such a list would establish an adequate baseline for performing USQDs. In addition, many components of the configuration management system are not described in SBMS. Better documentation of the purpose and interfaces for each component of the configuration management process is needed to determine whether all interfaces are formalized and whether any new procedures or processes are needed.

2.4 PNNL Integrated Assessments

Background

The 1996 Oversight evaluation found deficiencies related to the need to increase management monitoring and verification of activities and conditions in the field and to improve the self-assessment program. The implementation of the PNNL integrated assessment program, which includes both line management self-assessments and assessments performed by PNNL ES&H staff, was intended to address these deficiencies. PNNL has made a major commitment to the use of the integrated assessment program in order to change business direction from a compliance-oriented process

driven by external oversight to a process that depends on a program of self-assessment that integrates both PNNL and customer business and strategic goals. Integrated assessment is intended to provide PNNL line managers, staff, customers, and stakeholders with accurate business and operational performance information that can be used to make fact-based decisions and identify and implement needed improvements. Integrated assessment is accomplished through the following four functional elements: self-assessment, peer review, internal auditing, and independent oversight. The process of integrated assessments consists of: 1) establishing organizational performance objectives and indicators; 2) monitoring progress using an assessment plan; 3) evaluating performance; 4) and implementing improvements. Personnel from the Quality Division staff are matrixed to the individual PNNL organizations to provide administrative support for the self-assessment program. These personnel have been instrumental in ensuring that the program remains on track.

Areas for improvement identified by recent internal self-assessments and by the ISMS verification assessment are being reviewed by the Quality Division, and corrective actions are being developed. Key areas for improvements identified by these PNNL processes included:

- Worker participation needs to be strengthened.
- The lessons-learned program does not follow up on how information is used.
- The independent assessment program needs to include a validation of safety program implementation.
- Line organizations need to be more proactive in identifying potential Price-Anderson Amendments Act issues during self-assessments.

Positive Attributes

The integrated assessment program is well defined in SBMS. The integrated assessment program is defined in an SBMS subject area and further supported by a standard and procedures. The procedures provide detailed direction on how to perform the key steps of the program, which include establishing organizational performance objectives and indicators, monitoring progress using an assessment plan, evaluating performance, and implementing improvements.

In accordance with their detailed self-assessment plans, the individual PNNL organizations have completed several comprehensive safety-related self-assessments at all levels. The Environmental Technology Division (ETD) and ES&H Directorate assessment of ES&H revealed that most line management self-assessments identified in the plans were being completed. The scope of the self-assessments was adequate, and the effort taken to complete the self-assessments was appropriate. The content and detail provided in the ES&H Directorate's programmatic reviews of such areas as electrical safety and confined space self-assessments were satisfactory.

PNNL Independent Oversight is providing useful assessments in many areas of importance. The PNNL Independent Oversight Division has performed several programmatic reviews of individual organizations. The results of these reviews have demonstrated that most organizations have adequately implemented the self-assessment program. Deficiencies identified by PNNL Independent Oversight are being corrected, and follow-up assessments are showing improved implementation of the program. Other important topical self-assessments completed by PNNL Independent Oversight include reviews of integrated safety management, closeout of Office of Oversight-identified deficiencies, and configuration management.

Weaknesses

The self-assessment program is not consistently implemented in accordance with established requirements. The safety and health self-assessment evaluation form (checklist) used in the ETD consists of 18 topical areas with 75 supporting criteria. In general, the assessors are not indicating which criteria were reviewed in the topic areas. This information would be helpful for the next assessor to pick up missed areas. In some ETD divisions, PNNL does not have a method to ensure that self-assessment action items are closed. Deficiencies were also evident in some of the ES&H Directorate's self-assessment reports:

- It was not clear in the reports which self-assessment lines of inquiry were reviewed. (Electrical Safety and Confined Space)

- Some items were indicated as being in compliance when no walk-through had been performed as required in the assessment method. (Radiological Work and Entry Control Functional Element)

- Parts of the self-assessment were evaluated as compliant based on previously performed self-assessments without any additional review. It would be more appropriate to mark these parts as not reviewed. (Radiological Work and Entry Control Functional Element)

- The assessment method was not clearly defined. (Radiological Work and Entry Control Functional Element and Confined Space Program)

Assessment of PNNL Integrated Assessment Program

PNNL has succeeded in its efforts to implement a useful integrated assessment program supported by a viable self-assessment program. The integrated assessment program implementation has addressed the Office of Oversight's findings related to the need for increased management monitoring and verification of activities and improving the self-assessment program. This follow-up review discovered some weaknesses with the rigor of implementation of the self-assessment program. Management attention is needed in this area to ensure that the required rigor and formality are maintained.

Although some weaknesses exist with the tracking of self-assessment actions items and the formality of some self-assessments, it was demonstrated that safety deficiencies are being addressed. For example, the self-assessments in RPL, a selected ETD laboratory room, and the ES&H program self-assessments were being used effectively to improve safety at PNNL.

2.5 Corrective Action Management

Background

The PNNL corrective action management system primarily consists of a computerized system called Corrective Action Tracking System (CATS). Its function is to track audit/assessment findings and subsequent corrective actions from sources such as radiological assessments, Independent Oversight significant issues, off-normal events, Price-Anderson Amendments Act-related issues, and external assessments. In addition, any organization has the option to use CATS as needed, and CATS is available for tracking self-assessments.

An inadequate corrective action management system was one of the most significant deficiencies identified during the 1996 Oversight evaluation. RL has taken some actions to improve its process for closing issues and verifying corrective actions. For example, RL has developed a process that uses closure sheets to formally document DOE's review. During the PNNL process for reviewing and responding to weaknesses in corrective action management, the lack of detailed information on the CATS deficiencies was highlighted. Some user meetings were conducted, and upgrades to CATS were recommended. In general, the upgrades focused on changing the system from a Laboratory-wide issues tracking system to a system that was more user-friendly and could be used to easily track self-assessments. Because of budget constraints and the low priority of the upgrades, improvements were not performed. The Oversight finding was closed out by PNNL and RL because the existing system was fully functional and effective. However, PNNL recently determined that the CATS software has a Year 2000 problem (i.e., it may not work with dates starting in the year 2000). PNNL has developed a CATS-replacement requirements document to guide the production of a new tracking system.

Positive Attributes

PNNL has a comprehensive corrective action management system in place that provides a good foundation for improvement. The system is tracking findings from identification to closure, including the Laboratory-wide issues identified by external assessments, the ES&H Division's self-assessments, and occurrences. The tracking system also documents the history of the decisions made on each action item as it progresses to final closure. With consistent direction and implementation, this system has the potential to improve the PNNL corrective action program.

Weaknesses

PNNL management has not provided clear direction or expectations on how to use the corrective action management system. A recent PNNL self-assessment identified the lack of direction for corrective actions as a weakness. There is no guidance on what deficiencies should be entered and tracked by CATS and how an action item should be developed to address a condition. The process for closing out action items, conditions, and assessments is not formalized. Because of the lack of Laboratory-wide direction, the ES&H Directorate has developed its own process for developing, tracking, implementing, and closing corrective actions assigned to the ES&H Directorate.

There was evidence that system capabilities are not being achieved because of the continued use of old methods. Specifically, Priority Planning Grid (PPG) numbers were previously used in CATS to control the level of closure review; a low number equated to a low level of review, and a high number equated to a high level of review. Since DOE and PNNL management no longer uses PPG numbers, a high number should be entered to ensure the highest level of review for closure. One user in the ES&H Directorate continues to enter a low PPG number on his CATS entries, effectively eliminating reviews by the condition owner and assessment owner. These additional reviews are needed to ensure proper closure.

RL's closeout of some significant conditions noted by the Office of Oversight was based on limited independent verification. For example, RL closed out the condition associated with a lack of PNNL procedure adherence based on self-assessments performed by PNNL, rather than performing RL-directed surveillances. A few surveillances of the PNNL self-assessment program provided only indirect verification of procedure adherence.

The basis for RL closure of some RL action items from the Office of Oversight evaluation was neither apparent nor well documented. RL tracks the status of corrective actions from the Office of Oversight evaluation in a Central Information Control System (CICS), but the basis for closing the item is not always documented in this system. For example, CICS Item EH22-4/96-F-020 pertained to the issue that Facility Representatives lacked sufficient time to conduct surveillances of operations due to the assignment of programmatic reviews. Few surveillances of operations have been performed since the 1996 Oversight evaluation. The RL Office of Environmental Safety and Health closed this item, but the basis for closure was not specified.

Corrective Action Management Assessment

To satisfy the expectation for a corrective action management system as described in the Office of Oversight evaluation report, PNNL needs to provide the necessary program direction in terms of an SBMS subject area, a standard, and supporting procedures. It is evident that CATS is functional and effective, but its use has been inconsistent because of informal controls and excessive reliance on users' experience. While the ES&H Directorate provided some guidance on how its users will utilize CATS, much more detailed guidance is needed. RL has made progress in its approach to closing corrective actions. However, RL needs to further improve its methods for closing items in CATS. It was evident that RL reviews were not providing independent verification that the significant deficiencies from the Oversight evaluation were closed. It is recognized that independent verification is not practical in every case; however, some independent sampling is needed.

2.6 DOE Management, Direction, and Monitoring of PNNL

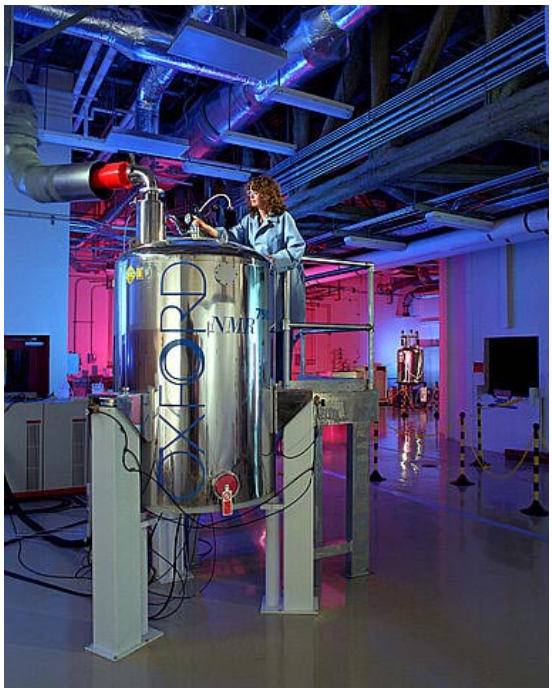
Background

The 1996 Oversight evaluation found that RL was not sufficiently engaged in safety management or oversight of contractor ES&H performance and needed to strengthen its Facility Representative program. The number of Facility Representatives was insufficient to perform the needed oversight, and the number and quality of surveillance reports were a concern at the time of the evaluation. RL developed a corrective action plan to address the evaluation findings.

RL was unable to hold PNNL financially accountable for ES&H performance in FY 1997 or FY 1998 because of delays in reaching final agreement on the PNNL Performance Plan. The delay was due in part to the continued disagreement between DOE Headquarters organizations and RL about the appropriateness of and need for financial incentive-based performance measures.

Positive Attributes

RL strengthened management of PNNL



activities. A reorganization of the staff reporting to the RL Assistant Manager for Science and Technology increased focus on operational activities at the division level in that organization. A new Science and Technology Operations Division worked effectively with PNNL to establish performance objectives for meeting an ES&H/operations goal (referred to at PNNL as a "critical outcome"), and RL periodically reviewed progress toward meeting these objectives. The establishment of objectives and the periodic performance reviews were effective in conveying RL's ES&H performance expectations to PNNL and in focusing the attention of both organizations on a common set of objectives. The Assistant Manager's presence in PNNL-controlled facilities was increased by conducting weekly management walk-throughs, during which ES&H activities were reviewed.

Weaknesses

Monitoring and assessment of contractor activities by RL continue to be a weakness. Although the Assistant Manager for Science and Technology had identified the need for five to seven Facility Representatives to oversee PNNL activities and facilities, only one qualified Facility Representative had been assigned since 1996, and this individual was not qualified for the highest-hazard PNNL facility (i.e., RPL). RL performed few routine surveillances or assessments and accepted PNNL's corrective action reports with little independent verification. This staffing shortage also contributed to insufficient monitoring and assessment of the PNNL self-assessment program over the past two years. The capability of the Science and Technology Operations Division to monitor and assess health physics and industrial hygiene activities was limited by lack of expertise in these disciplines.

Assessment of DOE Management, Direction, and Monitoring

Overall direction of contractor activities by RL improved. ES&H expectations, including performance goals, were clearly conveyed to PNNL by RL. However, monitoring and assessment of PNNL performance remained weak because RL management did not place sufficient priority on providing the subject matter experts and Facility Representatives needed to accomplish these activities. Some DOE monitoring and assessment are needed at the activity level to ensure that the ES&H goals and objectives that are being agreed upon at the top management level are being effectively implemented at the activity level. RL assessments of PNNL rely heavily on self-assessment data generated by PNNL. However, the PNNL self-assessment program is not yet mature enough to provide an adequate baseline or to allow such heavy reliance on its data. Recent staff additions in these areas were appropriate, but continued management attention will be needed to maintain adequate staffing and to ensure effective staff utilization.

2.7 PNNL Initiatives

Background

The 1996 Oversight evaluation found a need for increased PNNL management attention to achieving individual accountability and disciplined operations. Other findings related to management systems included a failure of some contractor managers, supervisors, and workers to recognize the importance of compliance with procedures. A corrective action

plan was developed by PNNL to address the Oversight findings.

In June 1998, a team of individuals from RL and DOE Headquarters reviewed the PNNL ISMS and its implementation. The DOE team found that the PNNL ISMS description, enabling documents, and processes conformed to DOE requirements and guidance but that implementation was inconsistent.

Positive Attributes

PNNL established management systems that provided an infrastructure for integrating safety into the management of Laboratory activities. Implementation of these systems, although incomplete, allowed PNNL to address several weaknesses identified in the 1996 Oversight evaluation. For example:

- SBMS allowed PNNL to identify applicable requirements and make them readily available to Laboratory staff.

- The integrated assessment program included comprehensive self-assessments by the line organization and aggressive independent reviews by the ES&H Independent Oversight staff that resulted in corrective actions to address continuing violations of procedural requirements.

- Facility use agreements, in conjunction with other controls, provided an effective mechanism for assuring that facility users did not introduce hazards beyond the scope of those evaluated by facility managers.

- The core team concept utilizes a multi-disciplinary team that has improved the process of planning, evaluating, prioritizing, and completing facility work activities.

- The PNNL ISMS was recently reviewed by a team of representatives from DOE Headquarters and RL and was found to meet applicable DOE guidance and requirements.

Weaknesses

Some PNNL managers did not demonstrate a strong commitment to procedural compliance. The 1996 Oversight evaluation noted procedure violations by contractor managers. Procedural violations by PNNL managers are continuing**.** Violations of procedures by PNNL managers indicated that some managers were not fully committed to procedural compliance, were not setting a good example for others, and are therefore not leaders for the development and implementation of integrated safety management. In addition, the continued failure to adhere to procedures, as noted previously in this report, indicates that management is accepting or tolerating poor procedures and procedural violations.

Assessment of PNNL Initiatives

PNNL developed several management systems to establish an infrastructure for integrating safety into the management of Laboratory activities. Implementation of these systems, although not yet complete, has improved performance and has allowed PNNL to address several weaknesses identified in the 1996 Oversight evaluation. However, recent violations of procedures by PNNL managers indicate a continuing lack of commitment to procedural adherence by some managers.

Appendix A

Office of Oversight Team Assignments

Office of Oversight Management Team

Deputy Assistant Secretary for Oversight

Glenn Podonsky

Associate Deputy Assistant Secretary

S. David Stadler - Operations
Neal Goldenberg - Technical Matters

Director, Office of ES&H Evaluations

Michael Kilpatrick
Patricia Worthington, Deputy Director

Director, Office of Security Evaluations

Barbara Stone

Director, Office of Planning and Analysis

Rebecca Smith
Frank Russo, Deputy Director

Director, Office of EH Residents

Ray Hardwick

Follow-up Team for the PNNL Review and Areas of Responsibility

Team Leader

Patricia Worthington, Management Systems

Deputy Team Leader

William Miller, Assessment Program, Corrective Action Program, Configuration Management

Team Members

Albert Gibson, Management Systems
James Lockridge, Work Planning and Control
Edward Stafford, Conduct of Operations
Chris Sorensen, EH Resident and Team Advisor
Mary Ann Sirk, Administrative Support
Tom Davis, Technical Writer